



(11) **EP 1 538 252 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.06.2005 Bulletin 2005/23

(51) Int Cl.7: **D06F 37/26**

(21) Application number: **03027556.4**

(22) Date of filing: **01.12.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK
(71) Applicant: **Electrolux Home Products**
Corporation N.V.
1930 Zaventem (BE)

(72) Inventor: **Poloni, Fabio**
33078 San Vito al Tagliamento Pordenone (IT)

(74) Representative: **Glugni, Valter**
PROPRIA S.r.l.,
Via Mazzini 13
33170 Pordenone (IT)

(54) **Plastic tub for a clothes washing machine**

(57) A plastic tub for a clothes washing machine, in particular a washing machine of front-loading type, comprising a front shell (10) and a rear shell (11), the rear shell being formed by a cylindrical envelope (12) and a rear wall (13) provided with reinforcing ribs, a passing through hub (18) provided at the centre of the rear wall for supporting the bearing of a central shaft by means of which a clothes containing drum is driven into rotation within the tub, said hub (18) being made by cast iron

over injected by plastic material.

The rear circular wall (13) of the rear shell (11) is shaped with a plurality of ribbed circular sectors (14,15) alternatively oriented in opposite axial direction, and at least one circular crown of radial ribs (21) is provided around the hub.

The tub structure results with a reduced and constant thickness of the rear part of the tub, so as the injection moulding cycle for producing it is correspondingly reduced.

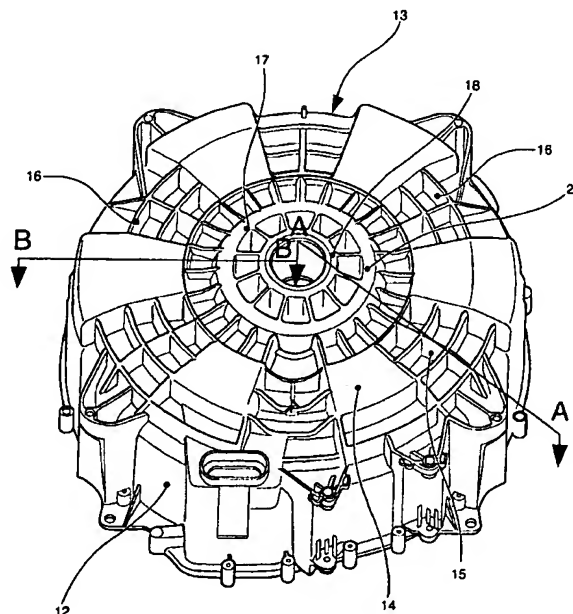


FIG.2

Description

[0001] The present invention relates to a new tub for a clothes washing machine, in particular a washing machine of front-loading type, said tub being made of plastic material and provided with an improved rear wall.

[0002] Plastic washing tubs for clothes washing machines are well known and substantially comprise a rigid structure forming a peripheral cylindrical envelope and a rear circular wall.

[0003] Usually, in correspondence of the rear wall of the tub, reinforcing ribs are integrally provided so as to increase the strength of the structure. In a preferred way, said ribs are arranged both circularly and radially in respect to the central portion of the rear wall.

[0004] A passing through hub is provided at the centre of the rear wall for supporting the bearing of a central shaft by means of which a clothes containing drum is driven into rotation within the tub.

[0005] Plastic washing tubs of this type are disclosed, for instance, in GB 2 261 881, EP 0 736 117 and EP 0 835 729.

[0006] At present, a washing tub is produced in a two-pieces construction, i.e. a front shell and a rear shell, by injection moulding of plastic material. The two shells are joined together by using any known means. Of course, the hub is provided in the centre of the rear shell.

[0007] Such a solution ensures both the support of the drum shaft and a watertight sealing of the tub, but has the drawback that the hub itself is directly exposed to the relatively high temperatures to which the washing liquor is usually heated up, said washing liquor touching directly the central portion of the rear shell.

[0008] This fact, owing to the mechanical action exerted by the rotating shaft against said hub, leads to a gradual stressing of the plastic material which, after a certain period, undergoes an aging process with a decay in its overall mechanical properties.

[0009] Therefore, in order to overcome this drawback the hub in the rear shell is made in cast iron and is embedded in the over injected plastic material.

[0010] This known solution, however, provides a large and not uniform thickness for the section of the rear shell, due to the mechanical constraints in the ejection from the mould. As a consequence, the tub moulding requires a long cycle time which reduces the moulding productivity and results in a costly working process.

[0011] It is therefore a purpose of the present invention to provide a plastic tub for a clothes washing machine having improved structural and functional characteristics with respect to prior art tubs, which is capable of ensuring long-term resistance to risks of decay and resulting loosening of the hub.

[0012] Another purpose of the present invention is to maintain the tub structure of a clothes washing machine of current type, but with a reduced and constant thickness of the rear part of the tub, so as the injection moulding cycle for producing it is correspondingly reduced.

[0013] According the present invention, this purpose is achieved by a washing tub as described in the appended claims.

[0014] The invention will be better appreciated from the following description given solely by way of non-limiting example and with reference to the accompanying drawings in which:

- Figure 1 shows schematically a perspective exploded view of a tub for washing machine according to the present invention;
- Figure 2 shows a perspective view of the rear shell of the tub represented in Figure 1;
- Figure 3 shows a partial section of the rear shell of the tub of Figure 2, taken along line A-A; and
- Figure 4 shows a partial section of the rear shell of the tub of Figure 2, taken along line B-B.

[0015] A tub for washing machine according with the present invention is schematically shown in Figure 1, wherein a front tub shell 10 and a rear tub shell 11 are represented in a perspective exploded view. The front shell 10 and the rear shell 11 are generally made by injection moulding of plastic material and are assembled by any known means, e.g. screws.

[0016] The rear shell 11 is substantially formed by a rigid body having a peripheral cylindrical envelope 12 and a rear circular wall 13.

[0017] The rear shell 11 is represented as a perspective view in Figure 2, this view being taken from the rear bottom of the tub.

[0018] According with a feature of the invention, the rear circular wall 13 shows a profile which is made of alternate sectors 14, 15, inwardly and outwardly directed, respectively, with respect to the axis of symmetry of the tub. Said sectors are developed along a circular crown, which starts from the external edge of the shell and extends to about half of the radius of the shell.

[0019] The shell in Figure 2 presents six sectors 14 and six sectors 15, but it is easy to understand that a different number of them may be carried out depending on the requested design of the tub.

[0020] Each of the sectors 14, 15 is shaped with ribs 16 which run both in radial and circular direction, mutually crossing, so as the strength of the rear shell is increased. According with a main feature of the invention, the rear circular wall 13 of the shell 11 is provided with a special profile in correspondence of its internal annular portion 17 which surrounds a central hub 18 for the spindle for the drum (not represented), as disclosed here below.

[0021] Figure 3 shows a schematic section of the rear shell 11, taken along line A-A of Figure 2, wherein the cylindrical envelope 12 and the central hub 18 are represented. The hub 18 is normally made with a core 19 of cast iron and is over injected by plastic material 20.

[0022] The plastic coating 20 has a constant thickness, as shown, but it ensures a stiffness comparable

to that of the previous known solution, which had a bigger plastic coating. This is due thanks to the additional crown of radial ribs 21 that is provided between the hub 18 and the envelope 12. There is also to note that the radial ribs 21 are connected together with the cylindrical envelope 12 through the ribbed sectors 15 of the rear wall 13. Moreover, between the rib 21 and ribs 15 is interposed a flat ring 22 which is substantially parallel to the rear wall 13, i.e. orthogonal to the rotation axis of the rear shell 12, see Figures 3 and 4.

[0023] Therefore, the bottom surface 22 of said circular crown of radial ribs 21 is in a plane different from those of the circular sectors 14,15. More precisely, the bottom surface 22 of said circular crown of radial ribs 21 is in a plane which is intermediate between the planes of adjacent circular sectors 14,15.

[0024] Thanks to the disclosed technical solution, the thickness of the plastic material over injected on the hub (18) may be steady all around the hub and substantially even to that of the ribs (14,15,21) on the rear wall (13) of the rear shell (11).

[0025] Of course, the whole shell 12 is integrally moulded and its specific profile is also designed with planes and undercuts, so as its is extraction from the mould may be particularly easy and advantageous.

used in that the thickness of the plastic material over injected on the hub (18) is steady all around the hub and substantially even to that of the ribs (14,15,21) on the rear wall (13) of the rear shell (11).

Claims

1. A plastic tub for a clothes washing machine, in particular a washing machine of front-loading type, comprising a front shell (10) and a rear shell (11), the rear shell being formed by a cylindrical envelope (12) and a rear wall (13) provided with reinforcing ribs, a passing through hub (18) provided at the centre of the rear wall for supporting the bearing of a central shaft by means of which a clothes containing drum is driven into rotation within the tub, said hub (18) being made by cast iron over injected by plastic material, **characterised in that** the rear circular wall (13) of the rear shell (11) is shaped with a plurality of ribbed circular sectors (14,15) alternatively oriented in opposite axial direction, and at least one circular crown of radial ribs (21) is provided around the hub.
2. A plastic tub according to claim 1, **characterised in that** the bottom surface (22) of said circular crown of radial ribs (21) is in a plane different from those of the circular sectors (14,15).
3. A plastic tub according to claim 1, **characterised in that** the bottom surface (22) of said circular crown of radial ribs (21) is in a plane which is intermediate between the planes of adjacent circular sectors (14,15).
4. A plastic tub according to claim 1 to 3, **character-**

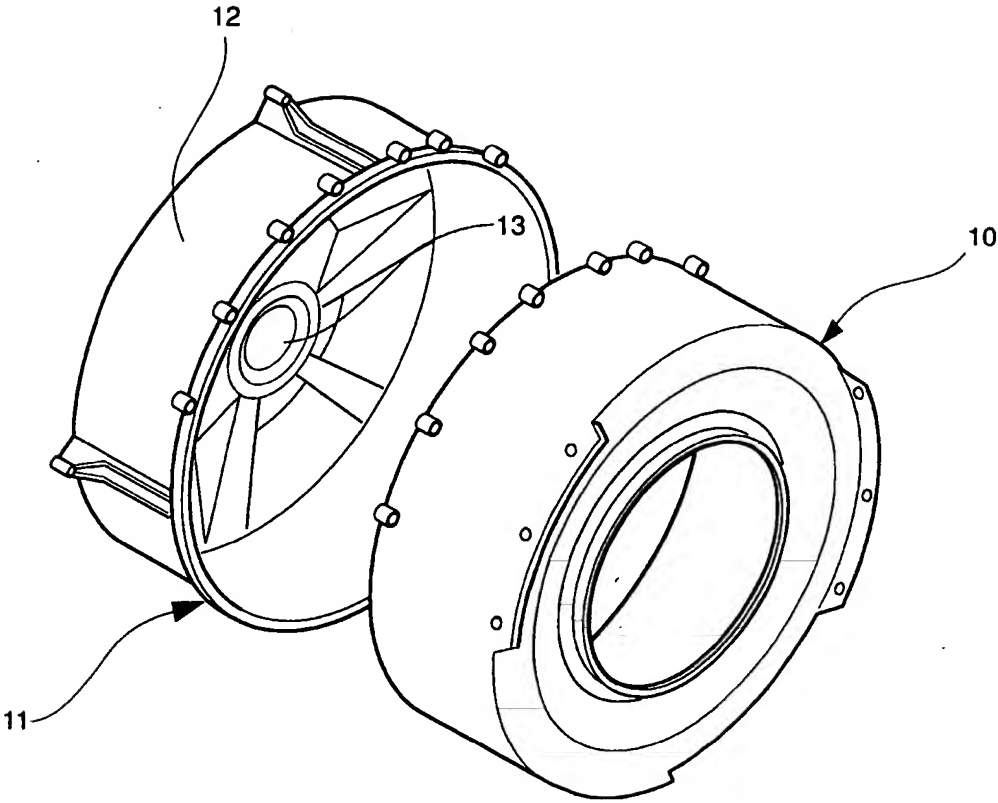


FIG.1

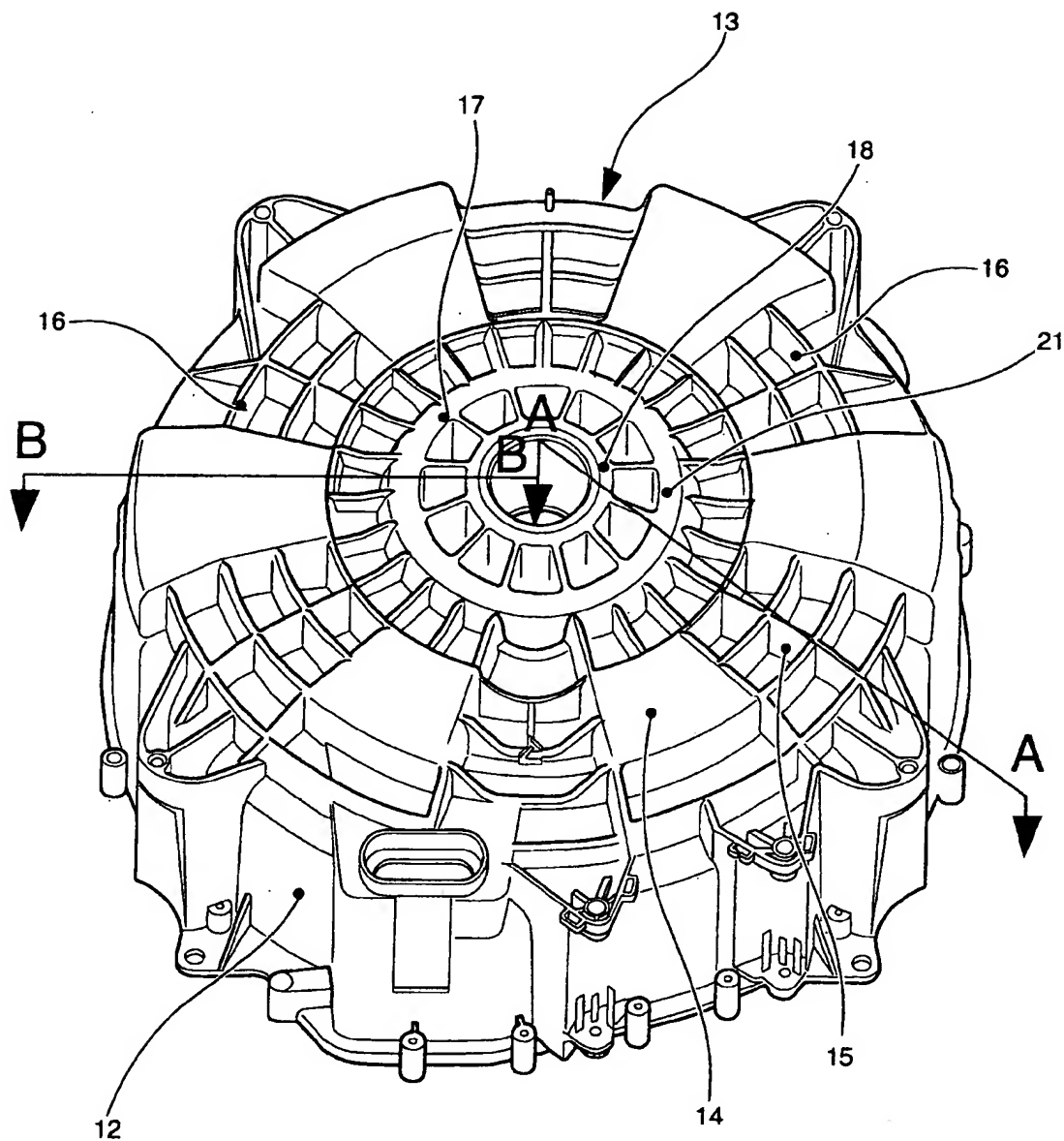


FIG.2

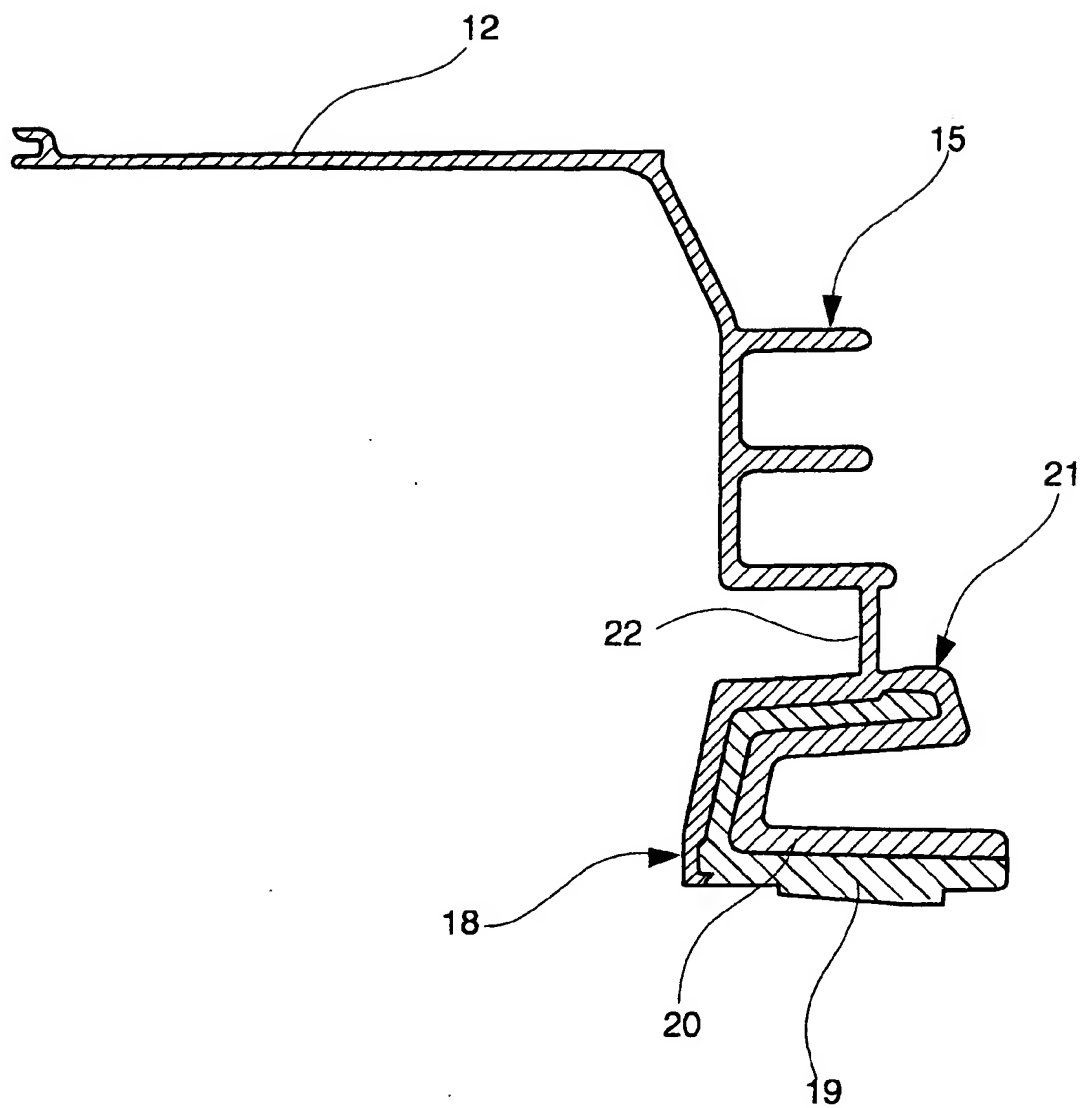


FIG.3

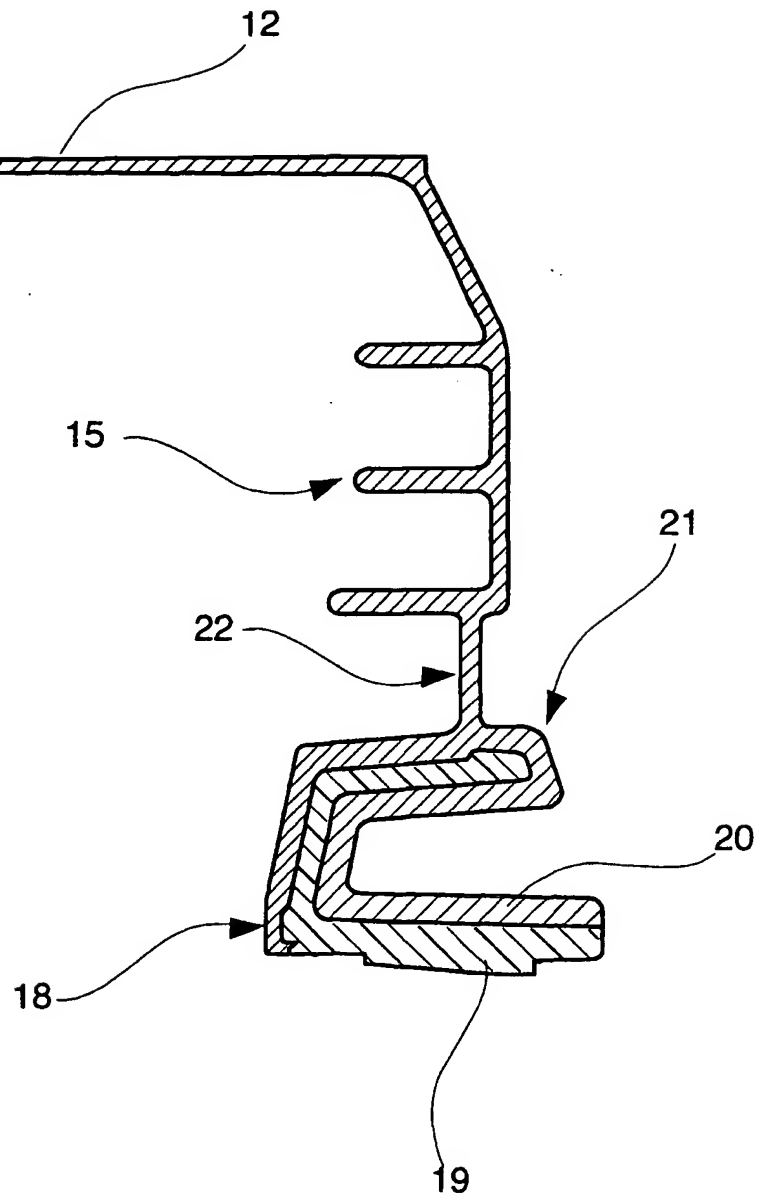


FIG.4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 02 7556

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	EP 0 497 109 A (ZANUSSI ELETTRODOMESTICI) 5 August 1992 (1992-08-05) * abstract * * column 4, line 18-30; claim 4; figures 2,3 *	1,4	D06F37/26
Y	GB 2 333 300 A (ELECTROLUX ZANUSSI ELETTRODOME) 21 July 1999 (1999-07-21) * the whole document *	1,4	
A	US 2002/194884 A1 (SKRIPPEK JORG ET AL) 26 December 2002 (2002-12-26) * the whole document *	2,3	
A	GB 2 272 913 A (CARADON ROLINX) 1 June 1994 (1994-06-01) * page 1, line 11-27 * * page 2, line 18-24 * * page 3, line 20 - page 4, line 21; figures *	1,4	
A	EP 0 969 132 A (GEN DOMESTIC APPLIANCES LIMITE) 5 January 2000 (2000-01-05) * column 3, paragraph 18 - column 4, paragraph 22; figure 4 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	US 4 423 607 A (MUNINI DINO) 3 January 1984 (1984-01-03) * column 1, line 54-66 * * column 3, line 4-15; figures *	1,4	D06F B29C
A,D	GB 2 261 881 A (ZANUSSI ELETTRODOMESTICI) 2 June 1993 (1993-06-02) * the whole document *	1	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 29 April 2004	Examiner Falkentoft, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

4
EPO FORM 1503 03.92 (P04.001)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 02 7556

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-04-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0497109	A	05-08-1992	IT 1250375 B	07-04-1995
			DE 69203355 D1	17-08-1995
			DE 69203355 T2	21-12-1995
			EP 0497109 A1	05-08-1992
			ES 2077254 T3	16-11-1995
			US 5211038 A	18-05-1993

GB 2333300	A	21-07-1999	IT PN980002 U1	20-07-1999
			DE 29821140 U1	28-01-1999
			ES 1041741 U1	16-07-1999
			FR 2773827 A1	23-07-1999

US 2002194884	A1	26-12-2002	DE 19960501 A1	21-06-2001
			AT 262065 T	15-04-2004
			CN 1409782 T	09-04-2003
			DE 50005735 D1	22-04-2004
			WO 0144556 A1	21-06-2001
			EP 1240376 A1	18-09-2002
			JP 2003516836 T	20-05-2003

GB 2272913	A	01-06-1994	NONE	

EP 0969132	A	05-01-2000	GB 2338543 A ,B	22-12-1999
			US 6279357 B1	28-08-2001
			AT 238442 T	15-05-2003
			DE 69907076 D1	28-05-2003
			EP 0969132 A1	05-01-2000
			JP 2000014995 A	18-01-2000
			KR 2000006061 A	25-01-2000

US 4423607	A	03-01-1984	IT 1136452 B	27-08-1986
			AT 11309 T	15-02-1985
			DE 3168264 D1	28-02-1985
			EP 0043429 A1	13-01-1982
			ES 258661 Y	01-06-1982
			JP 1184427 C	27-12-1983
			JP 57081384 A	21-05-1982
			JP 58015160 B	24-03-1983

GB 2261881	A	02-06-1993	IT PN910040 U1	27-05-1993
			CA 2083929 A1	28-05-1993
			DE 9215811 U1	18-02-1993
			ES 1022932 U1	01-06-1993
			FR 2684114 A1	28-05-1993
			US 5329791 A	19-07-1994

EPO FORM P0455

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82